REMARKS

The thorough examination given the subject application is acknowledged.

35 U.S.C. § 112

The Examiner has objected to claims 9 and 11-13 under 35 U.S.C. § 112. Claim 9 has been amended to make it dependent upon claim 8 to provide antecedent basis for the "first comparison means." Claims 11-13 have been amended so as to delete the language related to detection of "dangerous localized conditions" as requested by the Examiner. Replacement, clarifying language was added to these claims. For example, Claim 11, as amended, now recites a method of detecting "current wind velocity at different distances from an aircraft along a flight path of the aircraft and determining when differences in detected wind velocities exceed a predetermined amount..." Applicant, believes the 35 U.S.C. § 112 objections have been thereby overcome.

35 U.S.C. § 102

The Examiner has rejected claims 1, 3, 5 and 11 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,034,760 to Rees. The Applicant traverses the Examiner's rejection but has amended independent claims 1 and 11 to help highlight distinctions between the subject matter of that claim and Rees.

Rees deals with the detection of acoustic phenomena in an atmosphere "by optically sensing sound waves produced respectively by those adverse weather or other conditions and thereby providing early warning signals to aircraft pilots and/or ground personnel" (column 2, lines 13-16 [emphasis added]). The atmospheric phenomena are generated at a first point and travel over a long distance at Mach 1 wherein they are detected acoustically

at a second point The measurements made in Rees are associated with attempting to categorize "pressure induced refractive index changes from sound emitted by the described adverse weather or wake vortex conditions being present in a region of the atmosphere which is spaced a substantial stand off distance from the locally optically defined regions intercepting the sound waves" (column 2, lines 54-62). See also column 5, lines 25-34 and Figure 1.

In relation to claim 1 of the present application, there is no determination in Rees of current relative wind speed at plural predetermined different distances from which windshear is determined. Rather, Rees is concerned with optically sensing sound waves from distant weather at a probe volume 16 proximate the aircraft. See Rees, Figure 1.

Sound is propagated through a medium such as air by means of wavemotion. In wave propagation the medium as a whole is not moved by the sound; only the wave disturbance moves. Rees attempts to categorize sound traveling at Mach 1 that has been generated by conditions some distance away. In contrast, claim 1 recites determination of "current relative wind speeds at predetermined distances ... [and determination] if a windshear condition exists in front of said aircraft in airspace in the vicinity of the predetermined different distances."

It is submitted that Rees is not directed at wind velocity measurements or windshear measurements but rather acoustic compressions of an atmosphere. The acoustic compressions would not traditionally be categorized as "wind" in the same way that acoustic emissions from a loud speaker would not be considered to be a "wind."

It is further evident from the heterodyne mixing of Rees that acoustic phenomena rather than wind velocity phenomena are measured. For measurement of Wind Velocities

Mach-Zehnder detection (claims 4, 9) is more appropriately required. It is therefore considered that the Rees application would not be suitable for measuring wind velocities.

Independent claim 11, is likewise believed to patentably define over the teachings of Rees. Claim 11 recites detecting "current wind velocity at predetermined different distances from an aircraft along a flight path of the aircraft and determining when differences in the detected wind velocities exceed a predetermined amount...." The detection is of "a series of reflected optical responses from the atmosphere corresponding to reflections from the predetermined distances in front of the aircraft." As noted above, Rees does not teach such detection.

35 U.S.C. § 103

The Examiner has also rejected claims 2, 4 and 6-7 under 35 U.S.C. § 103(a) as being unpatentable over Rees. In respect of claim 2, the utilization of a GPS system allows for the identification of the location of a windshear event which in turn can be avoided by the aircraft. This is not disclosed by the prior art. The Applicant respectfully traverses the Examiner's objection.

Dependent Claims 4 and 9 are directed to the utilization of a differential Mach-Zehnder interferometer arrangement. There is no disclosure by the Examiner of why this utilization would be well known and the Applicant respectfully traverses the objection. With respect to dependent claim 7, the range specified has particularly advantageous operation and the Applicant again traverses the Examiner's objection.

Independent claims 8, 10 and 12 stand rejected under 35 U.S.C. § 103(a) as unpatentable over Rees. Each of these claims has been amended to specifically recite the detection of a windshear event or wind velocity measurements "in the vicinity of the

backscattering" of the backscattered light. Thus, current wind speeds and windshear events, not sound, are measured. And such measurements are derived from reflections at the location of the wind or windshear. This is in contrast to Rees who detects infrasound from distant weather where it is "heard."

Moreover, Rees does not determine windshear by comparing backscattering at a series of distances. Claim 8, for example recites the determining of "the Doppler shift of the backscattered light and a wind velocity and direction, relative to said aircraft at a series of distances..." The comparison of "wind velocity at said series of distances" allows the determination of "whether a windshear event is present in the vicinity of the backscattering of said backscattered light."

For the foregoing reasons, it is believed that the application, as amended, is believed to be in condition for allowance. Entry of the foregoing and prompt and favorable consideration of the application are respectfully requested.

In the event that there are any questions relating to this Amendment, or the application in general, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

Respectfully submitted,

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Date: March 14, 2003

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1. (Amended) A method of detecting a windshear condition in an atmosphere in front of an aircraft, the method comprising the steps of:

(a) projecting a series of optical pulses into an atmosphere ahead of the aircraft;

(b) detecting a series of reflected optical responses from the atmosphere corresponding to reflections from predetermined <u>different</u> distances in front of the aircraft;

(c) processing said reflected responses to determine a current relative wind speed at said predetermined distances in front of said aircraft;

(d) processing said current relative wind speeds to determine if a windshear condition exists in front of said aircraft <u>in airspace in the vicinity of the predetermined different distances</u>.

3. (Amended) A method as claimed in claim 1 wherein said optical pulses are derived from a <u>single</u> laser <u>device</u> having a small wavelength range.

8. (Amended) A detection system for detecting the presence of windshear in front of an aircraft, said system comprising:

a laser for transmitting a first portion of a series of optical pulses in front of said aircraft[:]<u>;</u>

a receiver for detecting back scattered light from said transmitted optical pulses;

delay means for delaying a second portion of said series of optical pulses for a time period substantially corresponding to the time of flight of said back scattered light; [and]

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first comparison means for comparing said delayed second portion with said back scattered light so as to determine <u>the Doppler shift of the back scattered light and</u> a wind velocity and direction, relative to said aircraft at a series of distances corresponding to said time of flight of each pulse; <u>and</u>

second comparison means for comparing the wind velocity at said series of distances to determine [is] <u>whether</u> a windshear event is present <u>in the vicinity of the back scattering of said backscattered light</u>.

9. (Amended) A system as claimed in claim [4] <u>8</u> wherein said first comparison means includes a Dual Differential Mach-Zehnder interferometer to indicate the frequency difference and positioning between two light beams, said interferometer comprising:

a First Mach-Zehnder interferometer incorporating a delay in one arm; [and]

a Second Mach-Zehnder interferometer incorporating a different delay in one arm; [and]

a means of determining the detected output of the First Mach-Zehnder <u>interferometer</u> to indicate the doppler shift in a first light beam; and

a means of determining the output of the Second Mach-Zehnder <u>interferometer</u> to indicate a wind velocity at a reflected distance from said aircraft.

10. (Amended) A Detection System to predict the presence of windshear along the flight path of an aircraft during the critical landing and take off phase comprising:

high powered solid state laser for transmitting a light beam; [and]

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receiver to capture a second back scattered light beam from the first beam; [and]

a means to provide a third light beam as a sample of the first beam; [and]

solid state module to delay said third beam for a time corresponding to the transit time of the second light beam and the first light beam; [and]

solid state detector to detect a differential response of the second light beam to the response of third light beam, said differential response corresponding to a wind velocity measurement in the vicinity of the backscattering of said second backscattered light beam; and

solid state computer to record and store wind velocity measurement.

11. (Amended) A method of detecting current wind velocity at predetermined different distances from an aircraft along a flight path of the aircraft and determining when differences in the detected wind velocities exceed a predetermined amount [a dangerous localized condition in an atmosphere in front of an aircraft], the method comprising the steps of:

(a) projecting a series of optical pulses into an atmosphere ahead of the aircraft;

(b) detecting a series of reflected optical responses from the atmosphere corresponding to reflections from the predetermined distances in front of the aircraft;

(c) processing said reflected responses to determine a current relative wind speed at said predetermined distances in front of said aircraft; and

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(d) processing said current relative wind speeds to determine if [a dangerous localized condition exists] alteration in the wind velocity exceeds said predetermined limit in front of said aircraft in the region of said reflections.

12. (Amended) A detection system for detecting the presence of differences in wind velocity at a series of distances [a dangerous localized condition] in front of an aircraft, said system comprising:

a laser for transmitting a first portion of a series of optical pulses in front of said aircraft;

a receiver for detecting back scattered light from said transmitted optical pulses;

delay means for delaying a second portion of said series of optical pulses for a time period substantially corresponding to the time of flight of said back scattered light; and

first comparison means for comparing said delayed second portion with said back scattered light so as to determine a wind velocity and direction, relative to said aircraft at a series of distances corresponding to said time of flight of each pulse; and

second comparison means for comparing the wind velocity at said series of distances to determine if [a dangerous localized atmospheric condition is present] differences in wind velocity exceed said predetermined amount in the vicinity of the backscattering of said back scattered light.

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13. (Amended) A detection system to predict the presence of spatial alterations in wind velocity exceeding a predetermined amount [a dangerous localized atmospheric condition] along the flight path of an aircraft during the critical landing and take off phase comprising:

high powered solid state laser for transmitting a light beam; [and]

receiver to capture a second back scattered light beam from the first beam; [and]

a means to provide a third light beam as a sample of the first beam; [and]

solid state module to delay said third beam for a time corresponding to the transit time of the second light beam and the first light beam; [and]

solid state detector to detect a differential response of the second light beam [top] to the response of third light beam; and

solid state computer to record and store a wind velocity measurement.